

Biggest Earth Movers Tote 75-Ton Loads

By Henry B. Comstock

TEN bellowing monsters will tear apart and reassemble a large slab of the Illinois River Valley come spring thaw. They won't be shaping a road, dam, or airstrip. They'll be gutting Caterpillar Tractor's 1,600-acre Peoria proving ground, in an earth-moving

CONTINUED

"**THINK IT OVER** before you buy her for a second car," Cat engineer John Lindquist tells me. "On a rough road you could burn off 20 bucks worth of rubber in an hour with this rig."





World's biggest scraper, the Cat 666 uses a 560-hp. diesel in front and a 420-hp. job in the

"spectacular" running on into summer.

Contractors who move mountains will like the show. First, because the machines are new tractor scrapers—high-capacity outfits that do triple duty as shovels, haul trucks, and spreaders. Second, these latest models are beefier, brisker, and more fully automated than before. Third, they come in as wide a range of supersizes as a nest of Chinese bowls.

For the man who bids on the 150-million-cubic-yard dam soon to be built across the Indus River in Pakistan, there's the new Cat 666. This world's biggest scraper tips the beam at 59 tons without load. She stretches 65 feet from her four-wheel tractor unit to the push block at her tail. Two diesel engines—one up front, the other aft—pour 980 collective horsepower into her four traction wheels. Mounted on the larger pair are a couple of 30-ply tubeless tires 10 feet in diameter. The tab for one of these 37½-by-51 shoes is \$8,500.

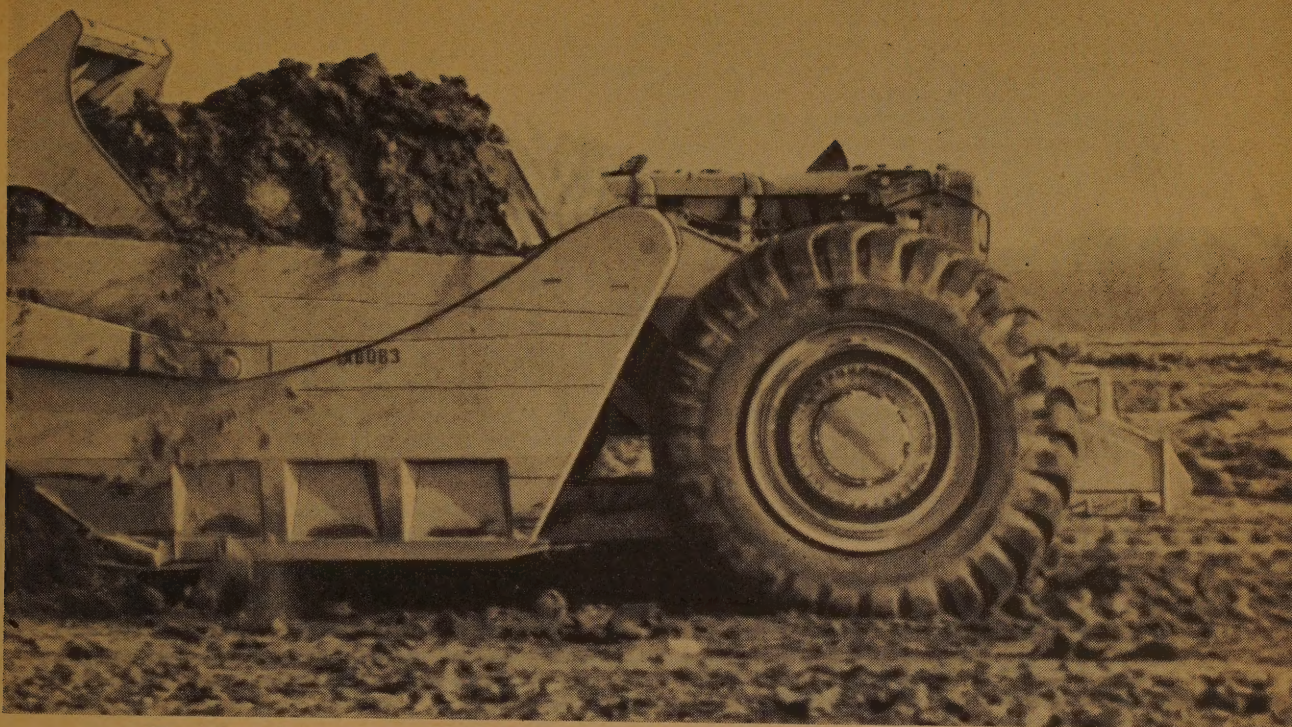
Between the traction wheels hangs a scooplke belly, or bowl, as large as a living room. Tilt its forward end down

and it becomes a shovel, lapping up enough dirt in a single pass to lower a 10-by-195-foot driveway nine inches. Then flip the bowl to horizontal and drop a steel apron over the front. Now you have a 54-yard truck that can wind up to 42 miles an hour on a good haul road. At the dump site, shove the rear of the bowl, or ejector, forward. Out plumps the load, smoothly, and to any desired depth.

Testing conditions: ideally bad. Recently, Caterpillar officials let *POPULAR SCIENCE* preview the 666 and her sisters.

"The best place to start," Chief Engineer Norman Risk told me, "is Dillon, Colorado. There, we've just placed what you might call the 'compact' model of our superscrapers in the hands of a construction outfit building a mile-long earth-fill dam. Field testing is our final step in developing a new machine. Bugs aren't likely to get by the proving ground. But if one does, you can bet a contractor will uncover it. After you've watched the 641 at work, then come back to Peoria."

So I hopped a jet to Denver and



rear. Together, they pour on 980 horsepower to keep her weight (268,000 pounds loaded) rolling.

drove to a Caterpillar field office high on the west slope of 12,000-foot Loveland Pass. There, John Lindquist, the research engineer on this project, and Dave Ottoman, Cat Colorado dealer's-service representative, took me in tow.

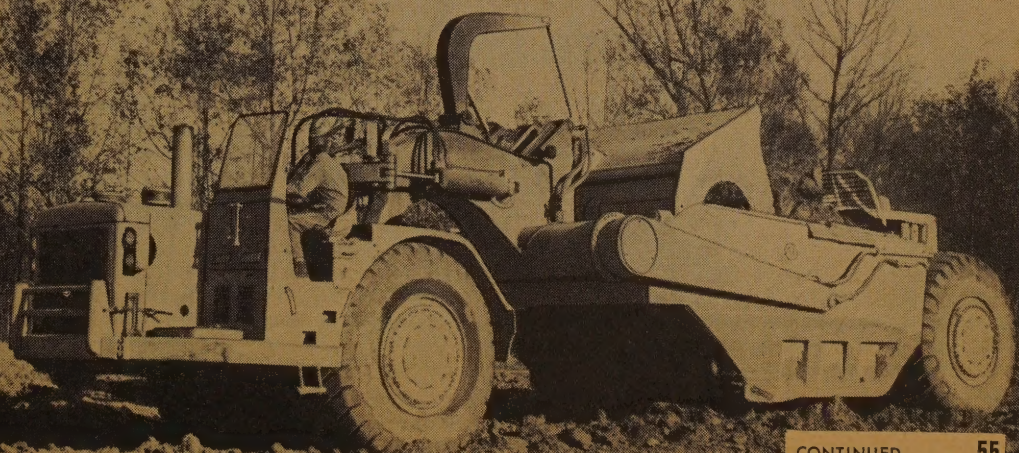
"Compared with some earth-moving jobs," Lindquist said, "this Dillon deal is a sandbox operation. But you couldn't find a nicer spot for field testing. The

Blue River Valley is a natural wind tunnel. When it isn't funneling in icy rain, it's whipping snow around. On clear days, it only kicks up tons of dust."

"Also," Ottoman added, "the air at 9,000 feet is skimpy enough to try any engine. The 641 is doing first-rate. Like other models, she has a turbocharger, driven by exhaust gases. It rams air into the intake manifold at just the right

EQUALLY POWERFUL MODEL 657 has the same two engines as the 666 but a somewhat smaller bowl capacity. It also uses a two-wheel tractor

rather than a four-wheeler. Contractors generally prefer to use the two-wheelers on jobs where the terrain is exceptionally rough.





A tractor scraper is three earth movers in one

1. A POWER SHOVEL: With the lip of her bowl angled down into the dirt, the Cat 641 lunges ahead, picking up 38 cubic yards of dirt. She doesn't need both those pusher dozers in tandem behind—but their 770 horsepower saves 20 seconds in loading time. When the bowl is full, powerful hydraulic rams tilt it back to horizontal, and the 641 becomes a . . .

pressure for any engine load. Because the stuff gets hot and thin in the process, it's also given a whirl through a water-cooled coil, or 'aftercooler.'"

Close scrape at 12,000 feet. "Dave's our best authority on the 641's behavior at high altitudes," Lindquist said. "To get her from the railhead at Denver to the site, he drove her over the same route you just took."

I thought of Loveland's topmost mile—a succession of hairpin turns offering an unfenced view of timber line a thousand feet straight down. It was hard to imagine anyone wheeling a 43-ton earth mover around those curves. But Ottoman brushed it off. "My only bad moment was when I belted into one bend and just squeaked by a house trailer with a swimming pool on top."

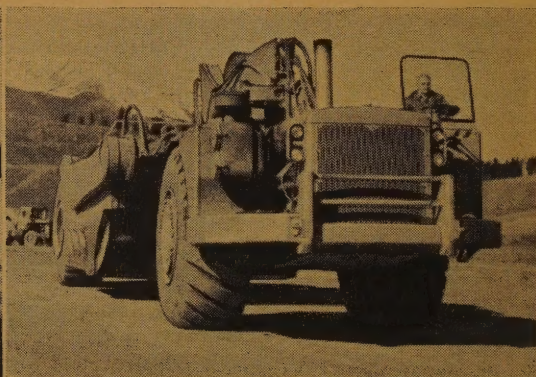
At the Blue River Valley, a huge ribbon of earth stretched as true as a mason's level between two snow-dusted mountains. Antlike outfits kept scurrying across it, voiding their loads, and hustling back. One fleet of 40-yard bottom-dump trucks was shuttling between the dam and a couple of drag-line cranes. It took three bucketfuls to crown each truck. Meanwhile, as many as eight others stacked up behind it.

"That's the soft spot in this operation," Lindquist said. "With tractor scrapers, it's different. Because they don't have to be spoon-fed, there's not a second lost in cycling time."

Bulldozers offer an assist. I soon saw what he meant. We threaded a maze of haul roads to another loading site. Here, in a muddy basin, three Cat D9 dozers



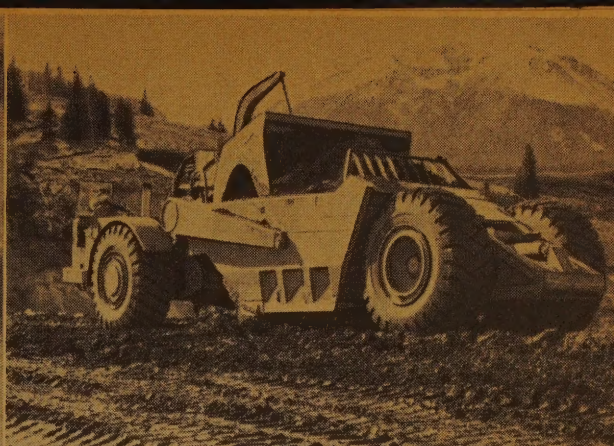
I FELT LIKE SABU, the elephant boy, when I took off down the haul road with the 641. It was out of my line to drive a rig where the radiator fan alone can soak up 25 horsepower.



FOR ALL HER 43 TONS, this huge scraper behaves like a hot rod. Tying her down was easy, too; she even has a hydraulic retarder that spares the service brakes on steep downgrades.



2. HAUL TRUCK: Pulling away from her pushers, the big machine takes off for the dump site. Most contractors build themselves first-class haul roads, both to cut cycling time and to increase equipment life. On this Potashnick Construction job at Dillon, Colo., the 641 gets up to an astonishing 40 m.p.h. Then, at the end of the dump run, she turns into a . . .



3. SPREADER: Up goes the apron, and the back wall of the bowl, called the ejector, slides slowly forward, spilling the load over the lip smoothly and without voids. On all these super-scrapers there's a conspicuous absence of out-board rigging. Only the draft arms need be removed to reduce width to an acceptable 10 feet for transport on rails or highways.

were helping out. Every two minutes a scraper came bobbing in from the dam, cocked its head for a turnaround, and plunged into the "borrow" pit. Instantly, a dozer buckled onto its bustle. Then, with the scraper's bowl angled into the dirt, both outfits surged forward, the D9 laboring like a pusher engine getting a heavy freight train out of town.

In 30 seconds, black earth was boiling over the top of the bowl. Thundering hoarsely, the scraper broke away, wallowed out of the pit, and took off for the dam.

Meanwhile the other D9s were backing rapidly into place to give the next outfit an assist.

We watched three scrapers cycle through. Nobody was calling signals. But every operator was in the right place at the right time. As proof of it, two D9s were maneuvering into position for a superthrust when Lindquist pointed down the haul road. "Here comes the 641."

The canary-yellow outfit hot-rodding toward us dwarfed the rigs around her. Her driver sat in an elephant-boy position ahead of her left fender, prodding the big V-8 beside him with a heavy foot. I remembered the specs: "Horsepower, 560 at 2,100 r.p.m.; 5.4 bore by 6.5 stroke; bowl capacity, 38 yards." *Some compact*, I thought.

Sitting high. Ottoman was out on the road, waving a washout signal. When the scraper belched to a stop beside us,

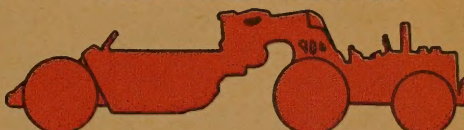
[Continued on page 208]

TWO-WHEEL TRACTOR



MODEL	CAPACITY	ENGINE	HP.
651	44 cu. yd.	V-8	560
641	38 cu. yd.	V-8	560
631B	30 cu. yd.	6	420
619C	18 cu. yd.	4	280

FOUR-WHEEL TRACTOR



660	54 cu. yd.	V-8	560
650	44 cu. yd.	V-8	560
632	38 cu. yd.	6	420
630B	30 cu. yd.	6	420

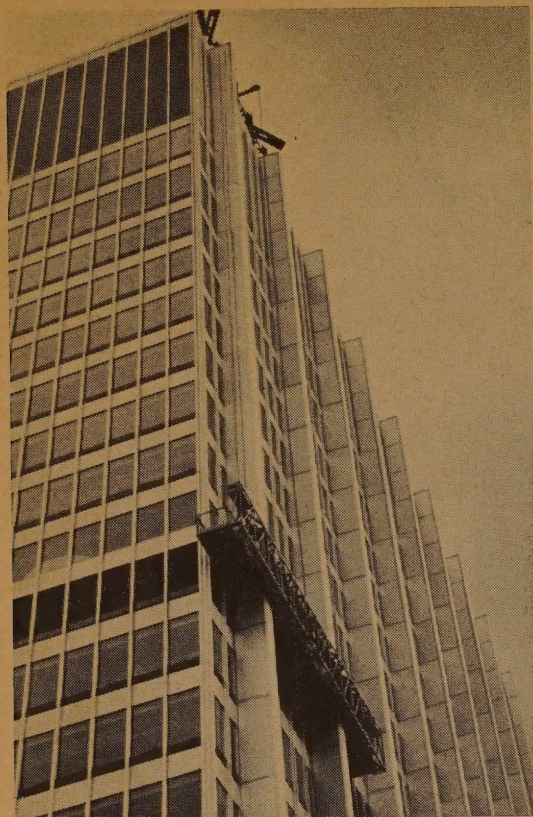
TWO-ENGINE TRACTOR



657	44 cu. yd.	V-8 (tractor) 6 (scraper)	980
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666	54 cu. yd.	V-8 (tractor) 6 (scraper)	980
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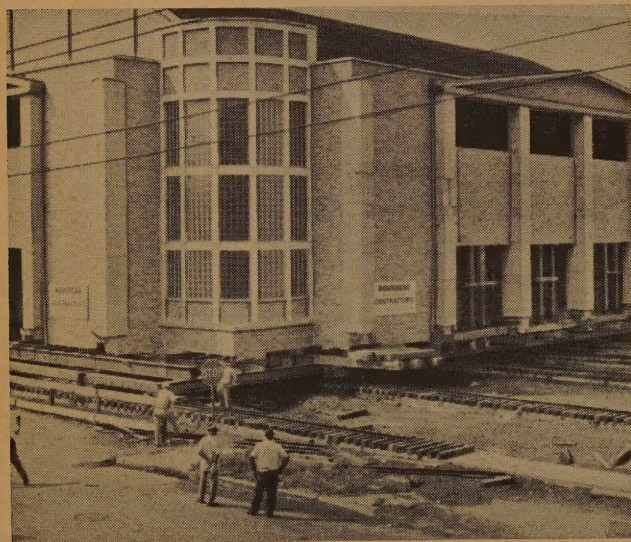
MOBILE SCAFFOLD rides up and down on cables from the top, swings out to move horizontally.



COLD WINDS blow hard 800 feet above ground, so window washers dress warmly. The elevator has a two-way radio and a chemical toilet.

Window-washing elevator

Windows in the new 60-story Chase Manhattan Bank in New York City are never opened because the building is completely air conditioned. The outsides are washed from a special elevator, built to fit around the exterior columns of the building, and operated by push-button controls. A five-man crew takes a full month to clean all of the building's 8,800 windows.



Church inches toward new site

Raised from its original foundation and lowered onto multiple parallel tracks, the 1,700-ton steel-and-concrete Progressive Baptist Church in Chicago was rolled to a new site one block away. The moving job took three weeks. The entire project is expected to take six months.



Scarecrow goes modern

Resembling halloween masks, heads of cats now hang in Austrian orchards to drive birds away from the fruit.

Shaped from metal and painted black, the faces have glass-filled cutouts for eyes and mouth that reflect sunlight. Suspended from a single cord, they swing and sway in any breeze, proving more effective, the Austrians say, than the former clothes-draped wooden crosses.

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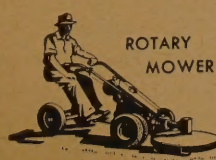


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Biggest Earth Movers Tote 75 Tons

[Continued from page 57]

he shouted up at Bill Jervis, the driver: "I've got a passenger for you."

I scrambled up the eight-foot-high fender and plumped down on it. Jervis turned halfway around and hollered, "All set?" It wouldn't have mattered. We were already plunging into the pit.

Posting violently, I resisted the temptation to grab at the knobs and levers. A few feet to the rear, a three-ton apron was beginning to rise like the curtain at the Bijou. At the same time, the front of the bowl was angling into the dirt, with 20 tons of hydraulic pressure behind it. Under its lip, boulders squealed and cracked. I learned later that the pumps used for this and other scraper chores soak up 200 horsepower. Fortunately, the rig's traction needs are lightest when those of the hydraulic system are at their peak.

Back on the haul road, with 50 tons of assorted landscape in her stomach, the 641 became a remarkably agile rig. Unlike the 666, she had a two-wheel tractor unit. Her engine was cantilevered out front. At the rear, a well-braced column acted as a hinge pin for the wishbonelike frame that straddled her bowl. To steer her, the stem of the wishbone, or gooseneck, was pushed this way or that way by a pair of husky hydraulic rams. Seated where I was, it was good to know that the giant couldn't jackknife. Those cylinders held it in a headlock, whatever the steering position. At the same time, the massive hinge post was free to rock from side to side. This was what kept all four of the outfit's wheels planted firmly on the ground, regardless of road irregularities. The axles of tractor scrapers are not sprung; only the tires absorb road shocks.

Halfway across the dam's broad back, Jervis pinched the 641 down to 10 miles an hour. Then he hoisted the apron with one lever, and triggered the bowl ejector with the other.

At the end of the pass, he made a U-turn in four-fifths of the scraper's length. Nudging his gear stick to neutral, he signaled me to watch him run through an upshift.

I guessed what was coming. When we got back to the borrow pit, he didn't turn into it. Instead, he pulled onto a



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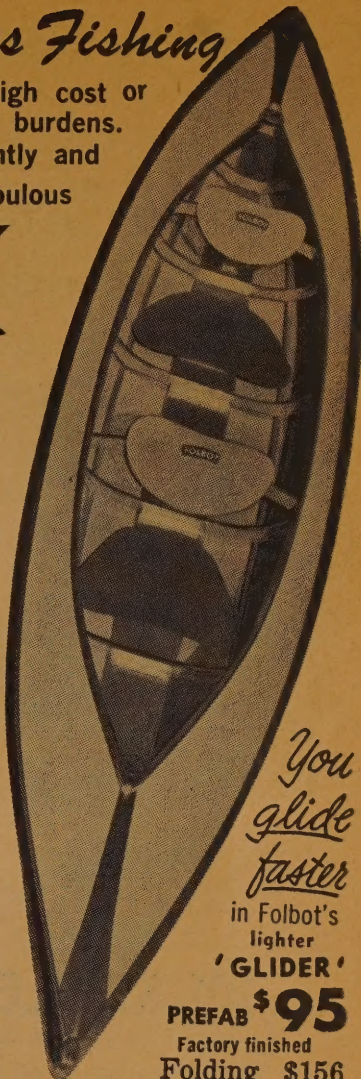
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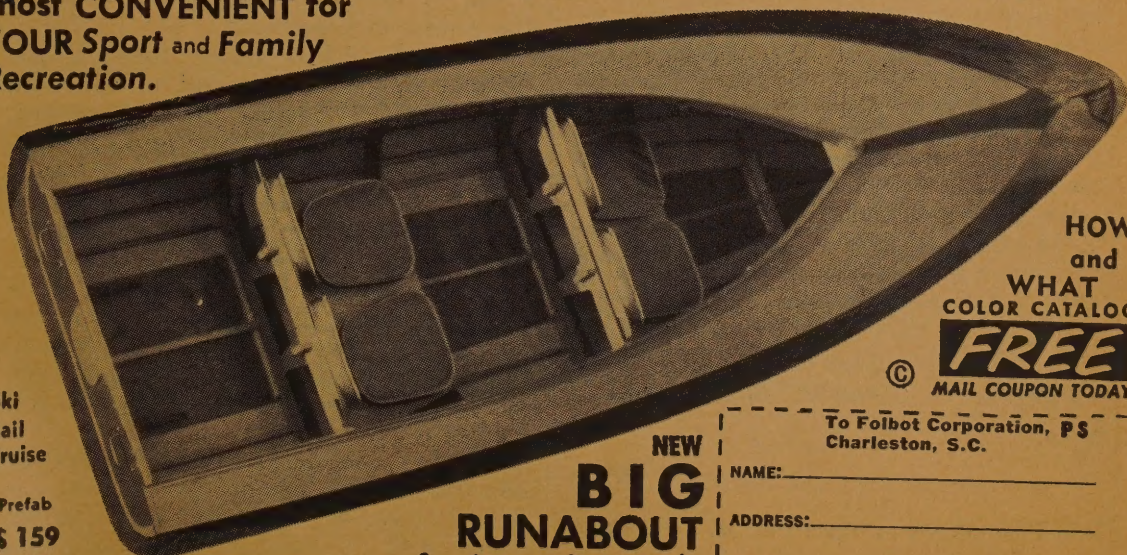
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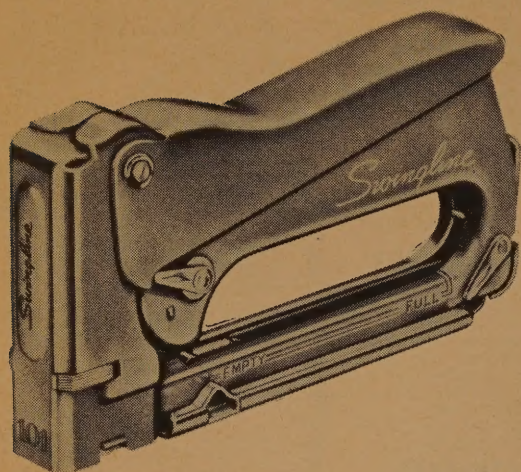
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stretch of haul road, stopped, and climbed off the seat. "You take her," he said, and dropped to the ground.

Behind the driver's wheel. Not since my granddad told me I could run his spanking-new Holt Caterpillar, back in 1922, have I approached a set of controls with such awe. I slipped into the bucket seat, cushioned with adjustable rubber torsion springs and a shock absorber. Underfoot were only two pedals—a service brake and a throttle. Beside my right knee a trim little lever projected from a box. You shoved it forward for reverse, or pulled it straight back for three progressive manual upshifts. On the dash, a tachometerlike indicator gave the cues.

I eased the lever into Number 1 notch, tromped on the accelerator, and took off. There were three distinct upsurges before the indicator needle climbed into the striped green area that told me I could advance the stick another notch. The same thing happened in second and third.

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When I kicked down through the manual ranges at the end of the haul road, the 641 bucked in mild protest. *Next time, punch the throttle*, I told myself. The brake action was surprisingly smooth, and cranking for the turn took no more effort than getting my 1952 DeSoto around the village square. Accumulating confidence, I poured it on, going back. Bringing the monster to a sedate stop at the pit, I was about to drop to the ground when I discovered that even on a slight slope, the 641 wanted to roll on her own.

"Where's the parking brake?" I shouted. Jervis pointed up at one of the scraper controls. I pushed the lever inboard until the bowl dipped gently into

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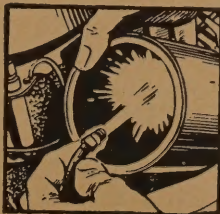


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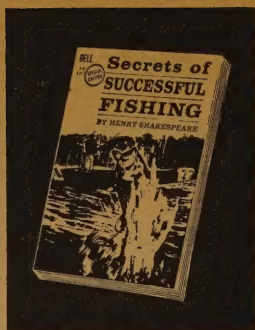
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Finally, I went out for a turn around the proving ground where the 666 and a couple of lesser scrapers were crouching like enormous yellow grasshoppers.

Three Cat officials were admiring the beasts. "There's just one question left," I said. "How do you justify two pushers helping an allegedly self-propelled shovel through a borrow pit?"

"That's one for the customers—not us," Gardner Hatch laughed. "Any scraper can pick up its load without an assist. But I'd be willing to bet that the first man who ever bought one welded a push block behind it and gave it a shove with another rig—just to save 20 seconds. Naturally, it wouldn't make sense to use two \$60,000 D9s with one \$110,000 outfit like the 666. But when you're running a fleet of scrapers, you spread the pusher cost thin. Those 20 seconds can make the difference between breaking even on a job and showing a profit."

"There's another angle," Robert Morrill cut in. "You need from one to two times more power for fast shoveling than for getting over the road. So the right place to keep those extra horses is in the pit."

Dale Turnbull wrapped it up. "The fact is that the contractor is the final engineer. But right now we're ready to offer him a litter of Cats that should meet his maximum needs for several years to come."